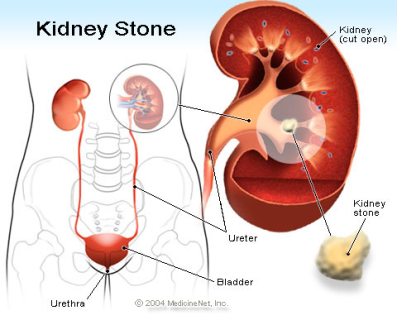
The formation of and treatment of kidney and gall stones

Formation:

* crystalline solid compounds formed from excess minerals and substances within the body
* kidney stones formed in the kidney from the ionic compound of oxalate (C2O4) and another mineral - usually calcium (C2O­4+ Ca -> CaC­2O4)
* gall stones formed when there is an excess of cholesterol in the gall bladder
* the cholesterol reacts with the pigment(bilirubin), and calcium salts in different concentrations to form the unique types of stones

Connections

1. Chapter 9.3: Gall stones and kidney stones are formed when an excess of solute occurs within the gall bladder or the kidney, therefore exceeding their Ksp values and forming precipitates. Gall stones form when the human body has an excess in cholesterol within the gall bladder. This occurs when there are no longer enough micelles to dissolve the cholesterol into liquid form. Another form of gall stones are pigment stones which contain calcium salts and the pigment bilirubin. Kidney stones are usually formed by an excess in oxalates. When the Qsp is greater than the Ksp meaning there are an excess in products, the solution would than attain equilibrium by shifting the left. This shift favours the formation of precipitates until equilibrium is re-established.

2. Chapter 8.1 + 8.2: As the concentration of kidney stone increases within the kidney, the acidity of the urine would usually increase. This is due to the chemical composition of the most common form of kidney stone, calcium oxalate. Calcium oxalate disassociate in water to form the neutral calcium ion and acidic oxalate ion. As the concentration of oxalate increases equilibrium would shift towards the right favouring the formation of products including hydronium ions. The increase of hydronium ions would therefore decrease pH levels increasing acidity.

3. Chapter 4.3: The key component of kidney stones, calcium oxalate is found most commonly in urine in a hydrate form (calcium oxalate dehydrate). This ionic bond forms a crystal lattice similar with other molecules to form a octahedral pattern. However other patterns are noted are dumbbell shapes and biconcave discs. The variety of shapes causes the actual kidney stone to not have a definite shape but a rough edgy shape.

Treatment

* bile pills disassociate cholesterol, allowing it to reverse back into a more fluid form
* lithotripsy uses pulses to break down the stones into fragments
* endoscopic surgery uses an endoscope to enter the body and remove the stones through the usage of miniature instruments
* open surgery removes the kidney or gall bladder completely preventing further casualties

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